## **Pre-Install Checklist**

Customer Information	Note: This checklist is derived from Investor Confidence Protocols and PG&E's OBF Al part of PG&E's OBF_AP QA/QC, but do not apply to the CHEEF pilots. Red edits rep		
Customer Name		Site Address	
Account ID SA ID Tax ID			

Checklist			Required f	for Tier		
	Check	Item	Tier 1	Tier 2	Tier 3	Description
Loan and Measure Criteria		SPP < 5yrs	Υ	Υ	Υ	Do measures included in loan package meet a 5 year simple payback period (10 years for municipal clients)?
		Loan Limits	Υ	Y	Y	Do total measure costs included in loan package meet the loan limits?
		Basic Lighting	Υ	Υ	Υ	Do measures <u>not include</u> any "basic lighting" measures, as defined by PG&E?
		LED DLC	Y	Y	Y	If lighting is included, are products on the Design Lights Consortium-Qualified Products List?
		No ROB	Y	Y	Y	Is all equipment replacement "early retirement", e.g. all equipment to be replaced is still functional?
		Re	quired for 1	Гier		
	Check	Item	Tier 1	Tier 2	Tier 3	Description
Costs		Cost Totals	Y	Y	Y	Have cost estimates been provided for all measures and activities included in the project loan application?
		Cost by Measure	Y	Y	Y	Are costs broken out by measure?
		Cost Buildups	Ν	Ν	Y	Are costs broken out by trade and/or by time vs. materials?
		Ancillary Costs	Ν	Y	Y	Do cost estimates include costs of all ancillary services required by OBF program, including QA provider, M&V provider if any, etc.?
		Utility Rates	Y	Y	Y	Have consistent utility cost rates and/or utility rate structure been provided, as used to calculate energy cost savings?
		TOU Rates	Ν	Y	Y	If demand reduction or demand shifting measures are included in project loan application, are TOU rates or rate structure provided?
		Re	quired for T	Гier		
	Check	Item	Tier 1	Tier 2	Tier 3	Description
Building Asset Data		Equipment List	Y	Y	Y	Has a list of existing equipment been provided for those measures included in the project loan application, with major characteristics?
		Photos	Y	Y	Y	Have equipment photos or images been provided to verify existing conditions?
		Equipment Data	N	V	v	Have equipment nameplate information, cut sheets, plans, or other supplementary technical asset documentation been provided to verify existing conditions?
		Trend Data	N N	I V	I V	Have equipment nameprate information, cut sneets, plans, or other supplementary technical asset documentation been provided to verify existing conditions? Has existing equipment trend data or list of trended points, where used for energy savings estimates, been provided?
		Audit	N N	ı V	I V	Has a building audit or site visit been conducted?
			IN N	I V	I V	
		Audit Report	N N	Y N	Y V*	Has a building audit or site visit report been provided which describes existing conditions and measure opportunities?
		Site Walk	IN	Ν	Y *	Has a site visit been conducted by QA provider to verify existing conditions? (* Only if deemed necessary by QA provider.)

		Rec	quired for T	ſier		
	Check	Item	Tier 1	Tier 2	Tier 3	Description
Building Energy Data		12 mos. Data	Y	Y	Y	Has 12-months recent and continuous building energy data been provided for all energy use at the building? Through Share My Data.
		15-min Data	Ν	Ν	Y	Have 2 weeks of 15-minute whole-building and/or end-use energy been provided?
		End-use Data	Ν	Ν	Y	Has end-use energy data been provided for major building end-uses, either as directly submetered or estimated?
		Savings Amount	Y	Y	Y	Are energy savings reasonable when compared with total existing facility energy consumption, e.g. no more than 75% of a given end-use or 40% of total facility use?
		Demand Data	Ν	Y	Y	If demand reduction or demand shifting measures are included in project loan application, does energy data include current building peaks by total and end-use?

		Rec	uired for '	Tier		
	Check	Item	Tier 1	Tier 2	Tier 3	Description
Energy Savings		Complete Calcs	Y	Y	Y	Are energy calculations provided for all measures for which energy savings are being claimed in the loan application?
		Inputs	Y	Y	Y	Are energy calculations inputs and variables clearly described?
		Assumptions	Y	Y	Y	Are all assumptions stated clearly, and reasonable per typical engineering practice e.g. per ASHRAE Handbook of Fundamentals?
		Detail	Y	Y	Y	Are calculations provided in sufficient detail to verify their accuracy and completeness?
		Judgment	Y	Y	Y	Are calculations reflective of typical engineering practice and physical laws, e.g. per ASHRAE Handbook of Fundamentals?
		Weather	Ν	Y	Y	Is a weather file or sample weather file provided for calculations for non-lighting measures?
		Energy Model	Ν	Y	Y	Are calculations provided in spreadsheet 8760 or weather bin format, or as a calibrated energy model using publicly available energy software e.g. DOE-2?
		Rec	quired for '	Гier		
	Check	Item	Tier 1	Tier 2	Tier 3	Description
Installation Verification		Install Verif Plan	Y	Y	Y	Is a plan or description provided for the process that will be conducted to verify installation is in accordance with initial scope?
		Collected Data	Ν	Y	Y	Does the installation plan clearly state equipment and data points to be verified and checked post-installation?
		Update Savings	Ν	Y	Y	Does the installation plan clearly describe the method to update estimated energy savings if needed, e.g. if the installation varies from the initial plan?
		Testing / Cx	Ν	Ν	Y	Does the installation plan include planned functional performance testing or commissioning (Cx) for relevant systems, such as a Cx plan with a designated Cx Authority (CxA)?
		Rec	uired for '	Tier		
	Check	Item	Tier 1	Tier 2	Tier 3	Description
Measurement & Verification Plan		M&V Plan	Y	Y	Y	Is a Measurement & Verification (M&V) plan provided which describes process to verify savings post-installation over an extended period of time?
		Collected Data	Y	Y	Y	Does the M&V plan clearly state data to be collected to verify savings, including whole-building energy data?
		Trend Data	Ν	Y	Y	Does the M&V plan clearly list all trend data to be collected, point-by-point?
		Calibration	Ν	Y	Y	Is the plan to update calculations reflective of typical engineering practice and physical laws, e.g. per ASHRAE Handbook of Fundamentals?
		Regression	Ν	Ν	Y	Does the M&V plan include a description of regression method to establish baseline and final savings, if a regression is to be used? Does the regression adjust for both weather and occupancy e.g. per ASHRAE 100?
		ASHRAE 14	Ν	Ν	Y	Is the M&V plan generally compliant with ASHRAE Guideline 14?
		Rec	quired for '	Гier		
	Check	Item	Tier 1	Tier 2	Tier 3	Description
Operations and Maintenance		O&M Service	Y	Y	Y	Is Operations & Maintenance (O&M) activity or service included with post-installation services?
		O&M Description	Y	Y	Y	Is planned O&M described or O&M plan provided, e.g. in a typical scope of work or scope of service?
		0.014 4 11 11	N	N	<b>X</b> 7	

## O&M Activities N N Y Does O&M service include, at a minimum, on-site training, equipment manuals, and an annual site visit?

O&M Cost N Y Y If O&M or retrocommissioning (RCx) is provided and included in loan project costs, is cost of service clearly stated and cost buildup provided?

Post-Install Checklist	Note: This checklist is derived from Investor Confidence Protocols and PG&E's OBF Alternative Pathway HOPP. Grey checklist items are part of PG&E's OBF_AP QA/QC, but do not apply to the CHEEF pilots. Red edits represent additional differentiation from the										
Customer Information	PG&E list										
Customer Name		Site Address									
Account ID											
SA ID											
Tax ID											

Costs Cost Totals Y Y Y Y Are final costs broken out by measure?   Cost Buildugs N Y Y Y Are final costs broken out by trade and/or by time vs. materials? Do final invoices, bills, or work orders provided align with this?   Ancillary Costs N Y Y Y Do costs invoices include costs of all ancillary services required by OBF program, including QA provider, M&V provider if any etc.?   Interview N Y Y Y Do costs invoices include costs of adl ancillary services required by OBF program, including QA provider, M&V provider if any etc.?   Interview N Y Y Y (If changed) Have consistent utility cost rates as tructure provided in project loan application, are TOU rates or rate structure provided?   Interview N Y Y Y Have a list of newly installed equipment been provided for those measures included in the project loan application, with major characteristics?   Photos Y Y Y Have equipment have on simulation on anges been provided for those measures included in the project loan application, with major characteristics?   Photos Y Y Y Have equipment have on viewly installed equipment testing for functionality been provided, e.g. functional testing or commissioning (Cx)?   Tr	Checklist			Required	for Tier		
Land Limits Y Y Y Do the measure scale findular in the second control of the long instance long instance or		Check	Item	Tier 1	Tier 2	Tier 3	Description
Basic Lighting Y	Loan and Measure Criteria		SPP < 5yrs	Y	Υ	Y	Do measures included in loan package meet a 5 year simple payback period (10 years for municipal clients)?
LED DLC Y Y Y Y Y It lighting is included, are products on the Design Lights Consortium Qualified Products List?   No ROB Y Y Y Y Y It lighting is included, are products on the Design Lights Consortium Qualified Products List?   Check Item Ter 2 Ter 3 Description   Costs Cost Totals Y Y Y Y Are final costs broken ont by measure?   Costs Cost Maague Y Y Y Y Y Y Are final costs broken ont by measure?   Cost Maague Y			Loan Limits	Y	Υ	Y	Do total measure costs included in loan package meet the loan limits?
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In the new paperbolic representation carry indefinition of the paperbolic of			LED DLC	Y	Y	Y	If lighting is included, are products on the Design Lights Consortium Qualified Products
Check   Item   Tier 1   Tier 2   Tier 3   Description Have final costs totals been provided for all measures and activities included in the project lean application? Have full invoices, bills, or work orders provided for all measures     Costs   Cost Totals   Y   Y   Y   Are final costs broken out by measure?     Cost Buildaps   N   N   Y   Y   Do costs invoices include costs of all ancillary services required by OBF program: including QA provider, M&V provider if any, etc.?     Utility Rates   Y   Y   Y   O cost sinvices include costs of all ancillary services required by OBF program: including QA provider, M&V provider if any, etc.?     Utility Rates   Y   Y   Y   Har final costs broken out by trade and/or billing measures are included in project lean application?     TOU Rates   N   Y   Y   Har final costs broken out by trade and/or billing measures are included in project lean application?     Building Asset Data   Check   Item   Tier 1   Tier 2   Tier 3   Description     Equipment List   Y   Y   Y   Has a list of newly installed equipment been provided for those measures included in the project lean application, with major characteristics?     Photos   Y   Y<			No ROB	Υ	Y	Y	Is all equipment replacement "early retirement", e.g. all equipment to be replaced is still functional?
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Building Energy Data 15-min Data N N Y Have 2 weeks of post-installation 15-minute whole-building and/or end-use energy been provided?   End-use Data N N Y Has post-installation end-use energy data been provided for major building end-uses, either as directly submetered or estimated?				Required	for Tier		
End-use Data N N Y Has post-installation end-use energy data been provided for major building end-uses, either as directly submetered or estimated?		Check	Item	Tier 1	Tier 2	Tier 3	Description
	Building Energy Data		15-min Data	Ν	Ν	Y	Have 2 weeks of post-installation 15-minute whole-building and/or end-use energy been provided?
Demand Data N Y Y If demand reduction or demand shifting measures are included in project loan application, does energy data include post-installation building neaks by			End-use Data	Ν	Ν	Y	Has post-installation end-use energy data been provided for major building end-uses, either as directly submetered or estimated?
Demand Data N Y Y If demand reduction or demand shifting measures are included in project loan application, does energy data include post-installation building neaks by							
			Demand Data	Ν	Y	Y	If demand reduction or demand shifting measures are included in project loan application, does energy data include post-installation building peaks by total and end-use?

			<b>Required</b> f	or Tier		
	Check	Item	Tier 1	Tier 2	Tier 3	Description
Energy Savings		Complete Calcs	Y	Y	Y	Are energy calculations provided for all measures for which energy savings are being claimed in the loan application?
		Inputs	Y	Y	Y	Are energy calculations inputs and variables consistent with initial application?
		Assumptions	Y	Y	Y	Are all assumptions consistent with initial application?
		Detail	Y	Y	Y	Are calculations provided in sufficient detail to verify their accuracy and completeness?
		Judgment	Y	Y	Y	Are calculations consistent with initial application?
		Weather	Ν	Y	Y	(If changed) Is a weather file or sample weather file provided for calculations for non-lighting measures?
		Energy Model	Ν	Y	Y	Are updated calculations provided in spreadsheet 8760 or weather bin format, or as a calibrated energy model using publicly available energy software e.g. DOE-2?

			<b>Required</b> f	or Tier		
	Check	Item	Tier 1	Tier 2	Tier 3	Description
Installation Verification		Install Verif Plan	Y	Y	Y	Has installation verification been conducted per the initial plan?
		Update Savings	Y	Y	Y	Have updated energy savings and calculations been provided, if needed?
		Functional Tests	Ν	Y	Y	Does installation verification include equipment functional testing reports, punch lists, and/or spot measurements as appropriate?
		As-Builts	Ν	Ν	Y	Are as-built drawings provided if appropriate?
		Cx	Ν	Ν	Y	Is a functional testing or commissioning (Cx) report included that documents testing performed, as appropriate?
			Required f	or Tier		
	Check	Item	Tier 1	Tier 2	Tier 3	Description
Measurement & Verification Plan		M&V Plan	Y	Y	Y	Has an updated M&V plan been provided, if project scope has changed?

			<b>Required</b>	for Tier		
	Check	Item	Tier 1	Tier 2	Tier 3	Description
Operations and Maintenance		O&M Service	Y	Y	Y	Has O&M activity or service, e.g. training, been conducted post-installation per initial O&M service description in initial application?